AMENDMENTS TO THE CLAIMS:

1. (Previously presented) A method for manufacturing an optical transmission device comprising:

mixing a first photosetting resin comprising a first photopolymerization initiator and a first monomer or oligomer to be polymerized in a first polymerization type by said first photopolymerization initiator, and a second photosetting resin comprising a second photopolymerization initiator and a second monomer or oligomer to be polymerized in a second polymerization type that is different from said first polymerization type by said second photopolymerization initiator;

forming a core portion of the optical transmission device by hardening said first photosetting resin by making a first irradiation that activates said first photopolymerization initiator but does not activate said second photopolymerization initiator; and

forming a clad portion of the optical transmission device by hardening both said first photosetting resin and said second photosetting resin by making a second irradiation that activates both said first and second photopolymerization initiators,

wherein said first irradiation has a wavelength shorter than the longest wavelength required to activate said first photopolymerization and longer than the longest wavelength required to activate said second photopolymerization, and

wherein one of said first polymerization type and said second polymerization type comprises radical polymerization, and the other comprises cationic polymerization.

2. (Previously presented) A method for manufacturing an optical transmission device according to claim 1, wherein said first polymerization type comprises radical polymerization, and said second polymerization type comprises cationic polymerization.

3. (Previously presented) A method for manufacturing an optical transmission device according to claim 1, wherein, when said core portion of a length L (unit of cm) is formed in a time s (unit of second) employing a light with a wavelength λ_W and an intensity of illumination I_o (unit of mW/cm^2), an optical loss a (unit of dB/cm) of said first photosetting resin before being hardened and a minimum amount of exposure $\sigma_A(\lambda_w)$ (unit of mJ/cm^2) for hardening at the wavelength λ_w satisfy the following expression:

$$a \leq \frac{10}{L}\log_{10}\frac{I_0 - s}{\sigma_A(\lambda_W)} \quad .$$

4. (Original) A method for manufacturing an optical transmission device according to claim l, wherein said first photopolymerization initiator is activated through two photon absorption.

5. (Previously presented) A method for manufacturing an optical transmission device according to claim l, further comprising:

making said first irradiation by applying a light flux of a minute diameter into a mixed resin of said first photosetting resin and said second photosetting resin to thereby grow said core portion with a substantially constant diameter so as to extend in a passing direction of the light flux; and

disposing a low refractive index structure to surround a designed terminal area of the light flux to allow said core portion to reach said designed terminal area, whereby if said light flux gets rid of said designed terminal area, said light flux is refracted due to total reflection on said low refractive index structure to reach said designed terminal area, thereby growing said core portion to reach said designed terminal area.

6. (Previously presented) A method for manufacturing an optical transmission device according to claim 5, wherein said designed terminal area comprises a circular area, and said low refractive index structure forms an inner wall on a side face of a truncated cone with said circular area as an upper face.

7. (Previously presented) A method for manufacturing an optical transmission device according to claim 6, wherein said designed terminal area comprises a circle of radius a, and said core portion is designed to rectilinearly advance at least from a position distance b off a center of said circle of radius a and orthogonal to said designed terminal area, wherein an inclination angle θ_m of the side wall of said truncated cone satisfies the following expression, where a height of said truncated cone is L_m, a refractive index of said core portion with the substantially constant diameter is n_l, and a refractive index of said low refractive index structure is n_m,

$$0 < \theta_m \leqq \tan^{-1} \frac{\sqrt{(b+at)^2 - 4(a-bt+L_m t)L_m t} - b - at}{2L_m t}$$

$$t = \tan\theta_{\max} = \tan\left(\cos^{-1}\frac{n_m}{n_1}\right)$$

8. (Previously presented) A method for manufacturing an optical transmission device according to claim 5, wherein said low refractive index structure forms a part of a spheroid with a major axis as a rotation axis, said designed terminal area comprises one focal point of an elliptic section with the rotation axis of said spheroid as a major axis, in which said core portion is designed to advance rectilinearly at least from the other focal point.

9. (Previously presented) A method for manufacturing an optical transmission device according to claim 8, wherein axes of coordinates are taken in a space, and said designed terminal area has a disk shape with a radius a centered at a point (0, b/2, 0) and perpendicular to the y axis, in which said core portion is designed to advance rectilinearly at least from a position of a point (0, -b/2, 0), and where a refractive index of said core portion is n_l, a refractive index of said low refractive index structure is n_m, said spheroid is made by rotating a following ellipse with the y axis as a major axis around the y axis as the rotation axis,

$$\frac{x^2}{{a_0}^2} + \frac{y^2}{{b_0}^2} = 1, z = 0$$

$${a_0}^2 = \frac{a^2 + a\sqrt{a^2 + b^2}}{2}$$

$$b_0 = \frac{a + \sqrt{a^2 + b^2}}{2}$$

and the following expression holds at a point on said ellipse of said low refractive index structure,

$$\cos\left\{\tan^{-1}\frac{y+\frac{b}{2}}{x}-\tan^{-1}\left(-\frac{b_0^2}{a_0^2}\frac{x}{y}\right)\right\}\leq\frac{n_m}{n_1}$$

10. (Previously presented) A method for manufacturing an optical transmission device according to claim l, further comprising:

making said first irradiation by applying a light flux of a minute diameter into a mixed resin of said first photosetting resin and said second photosetting resin to thereby grow said core portion with a substantially constant diameter so as to extend in a passing direction of the light flux; and

disposing a reflective structure to surround a designed terminal area of the light flux to allow said core portion to reach said designed terminal area, whereby if said light flux gets rid of said designed terminal area, said light flux is refracted on said reflective structure to reach said designed terminal area, thereby growing said core portion to reach said designed terminal area.

11. (Previously presented) A method for manufacturing an optical transmission device according to claim 10, wherein said terminal area comprises a circular area, and said reflective structure forms an inner wall on a side face of a truncated cone with said circular area as an upper face.

12. (Previously presented) A method for manufacturing an optical transmission device according to claim 11, wherein said designed terminal area comprises a circle of radius a, and said core portion is designed to rectilinearly propagate at least from a position

distance b off a center of said circle of radius a and perpendicular to said designed terminal area, in which an inclination angle θ_m of the side wall of said truncated cone satisfies the following expression, where a height of said truncated cone is L_m,

$$0 < \theta_m \leqq \tan^{-1}\left\{\frac{1}{3L_m b}\left(3\sqrt{\frac{s_6}{2}} - as_3 - 3\sqrt{\frac{2}{s_6}}\right)s_2\right\}$$

$$s_1 = -16a^3b^3 + 72ab^3L_m^{\ 3} - 54ab^2L_m^{\ 3}$$

$$s_2 = -4a^2b^2 - 9a^2L_m^{\ 2} + 3b^2L_m^{\ 2}$$

$$s_3 = 2b + 3L_m$$

$$s_4 = 2b - 3L_m$$

$$s_5 = 27ab^2L_m^{\ 2}s_4 - 2a^3s_3^{\ 3} + 9abL_ms_3\left(4a^2 + bL_m\right)$$

$$s_6 = s_1 + \sqrt{4s_2^{\ 3} + s_5^{\ 2}}$$

13. (Previously presented) A method for manufacturing an optical transmission device according to claim 10, wherein said reflective structure forms a part of a spheroid with a major axis as a rotation axis, and said terminal area comprises one focal point of an elliptic section with the rotation axis of said spheroid as a major axis, in which said self-forming optical transmission device is designed to advance rectilinearly at least from that the other focal point.

14. (Previously presented) A method for manufacturing an optical transmission device according to claim 13, wherein axes of coordinates are taken in a space, and said designed terminal area has a disk shape with a radius a centered at a point (0, b/2, 0) and perpendicular to the y axis, in which said clad portion is designed to advance rectilinearly from a position of a point (0, -b/2, 0) , and said spheroid is made by rotating a following ellipse with the y axis as a major axis around the y axis as the rotation axis,

$$\frac{x^2}{a_0^{\,2}} + \frac{y^2}{b_0^{\,2}} = 1, z = 0$$

$$a_0^{\,2} = \frac{a^2 + a\sqrt{a^2 + b^2}}{2}$$

$$b_0 = \frac{a + \sqrt{a^2 + b^2}}{2}$$

15. (Previously presented) A method for manufacturing an optical transmission device comprising:

mixing a first photosetting resin comprising a first photopolymerization initiator and a first monomer or oligomer to be polymerized in a first polymerization type by said first photopolymerization initiator, and a second photosetting resin comprising a second photopolymerization initiator and a second monomer or oligomer to be polymerized in a second polymerization type that is different from said first polymerization type by said second photopolymerization initiator;

forming a core portion of the optical transmission device by hardening said first photosetting resin by making a first irradiation that activates said first photopolymerization initiator but does not activate said second photopolymerization initiator; and

forming a clad portion of the optical transmission device by hardening both said first photosetting resin and said second photosetting resin by making a second irradiation that activates both said first and second photopolymerization initiators;

wherein said first irradiation has an amount of exposure more than the minimum amount of exposure required to harden said first photosetting resin substantially

completely and smaller than the maximum amount of exposure not to harden said second photosetting resin completely.

16. (Previously presented) A method for manufacturing an optical transmission device according to claim 15, wherein one of said first polymerization type and said second polymerization type comprises radical polymerization, and the other comprises cationic polymerization.

17. (Original) A method for manufacturing an optical transmission device according to claim 15, wherein, when said core portion of a length L (unit of cm) is formed in a time s (unit of second) employing a light with a wavelength λ_W and an intensity of illumination I_0, (unit of mW/cm^2) , an optical loss a (unit of dB/cm) of said first photosetting resin before being hardened and a minimum amount of exposure σ_A (λ_w) (unit of mJ/cm^2) for hardening at the wavelength λ_w satisfy the following expression:

$$a \leqq \frac{10}{L} \log_{10} \frac{I_0 - s}{\sigma_A(\lambda_W)}$$

18. (Original) A method for manufacturing an optical transmission device according to claim 15, wherein said first photopolymerization initiator is activated through two photon absorption.

19. (Previously presented) A method for manufacturing an optical transmission device according to claim 15, further comprising:

making said first irradiation by applying a light flux of a minute diameter into a mixed resin of said first photosetting resin and said second photosetting resin to thereby grow said core portion with a substantially constant diameter so as to extend in a passing direction of the light flux; and

disposing a low refractive index structure to surround a designed terminal area of the light flux to allow said core portion to reach said designed terminal area, whereby if said light flux gets rid of said designed terminal area, said light flux is refracted due to total reflection on said low refractive index structure to reach said designed terminal area, thereby growing said core

portion to reach said designed terminal area.

20. (Previously presented) A method for manufacturing an optical transmission device according to claim 19, wherein said designed terminal area comprises a circular area, and said low refractive index structure forms an inner wall on a side face of a truncated cone with said circular area as an upper face.

21. (Previously presented) A method for manufacturing an optical transmission device according to claim 20, wherein said designed terminal area comprises a circle of radius a, and said core portion is designed to rectilinearly advance at least from a position distance b off a center of said circle of radius a and orthogonal to said designed terminal area, wherein an inclination angle θ_m of the side wall of said truncated cone satisfies the following expression, where a height of said truncated cone is L_m, a refractive index of said core portion with the substantially constant diameter is n_l, and a refractive index of said low refractive index structure is n_m,

$$0 < \theta_m \leqq \tan^{-1} \frac{\sqrt{(b + at)^2 - 4(a - bt + L_m t) L_m t} - b - at}{2 L_m t}$$

$$t = \tan\theta_{\max} = \tan\left(\cos^{-1}\frac{n_m}{n_1}\right)$$

22. (Previously presented) A method for manufacturing an optical transmission device according to claim 19, wherein said low refractive index structure forms a part of a spheroid with a major axis as a rotation axis, said designed terminal area comprises one focal point of an elliptic section with the rotation axis of said spheroid as a major axis, in which said core portion is designed to advance rectilinearly at least from the other focal point.

23. (Previously presented) A method for manufacturing an optical transmission device according to claim 22, wherein axes of coordinates are taken in a space, and said designed terminal area has a disk shape with a radius a centered at a point (0, b/2, 0) and perpendicular to y axis, in which said core portion is designed to advance rectilinearly at least from a position of a point (0, -b/2, 0), and where a refractive index of said core portion is n_l, a refractive index of said low refractive index structure is n_m, said spheroid is made by rotating a following ellipse with the y axis as a major axis around the y axis as the rotation axis,

$$\frac{x^2}{a_0^{\,2}} + \frac{y^2}{b_0^{\,2}} = 1, z = 0$$

$$a_0^{\,2} = \frac{a^2 + a\sqrt{a^2 + b^2}}{2}$$

$$b_0 = \frac{a + \sqrt{a^2 + b^2}}{2}$$

and the following expression holds at a point on said ellipse of said low refractive index structure,

$$\cos\left\{\tan^{-1}\frac{y+\frac{b}{2}}{x}-\tan^{-1}\left(-\frac{b_0^{\,2}}{a_0^{\,2}}\frac{x}{y}\right)\right\}\leqq\frac{n_m}{n_1}$$

24. (Previously presented) A method for manufacturing an optical transmission device according to claim 15, further comprising:

making said first irradiation by applying a light flux of a minute diameter into a mixed resin of said first photosetting resin and said second photosetting resin to thereby grow said core portion with a substantially constant diameter so as to extend in a passing direction of the light flux; and

disposing a reflective structure to surround a designed terminal area of the light flux to allow said core portion to reach said designed terminal area, whereby if said light flux gets rid of said designed terminal area, said light flux is refracted on said reflective structure to reach said designed terminal area, thereby growing said core portion to reach said designed terminal area.

25. (Previously presented) A method for manufacturing an optical transmission device according to claim 24, wherein said terminal area comprises a circular area, and said reflective structure forms an inner wall on a side face of a truncated cone with said circular area as an upper face.

26. (Previously presented) A method for manufacturing an optical transmission device according to claim 25, wherein said designed terminal area comprises a circle of radius a, and said core portion is designed to rectilinearly propagate at least from a position distance b off a center of said circle of radius a and perpendicular to said designed terminal area, in which an inclination angle θ_m of the side wall of said truncated cone satisfies the following expression, where a height of said truncated cone is L_m,

$$0 < \theta_m \leq \tan^{-1}\left\{\frac{1}{3L_m b}\left(\sqrt[3]{\frac{s_6}{2}} - as_3 - \sqrt[3]{\frac{2}{s_6}}\right)s_2\right\}$$

$$s_1 = -16a^3b^3 + 72ab^3L_m^{\ 2} - 54ab^2L_m^{\ 3}$$

$$s_2 = -4a^2b^2 - 9a^2L_m^{\ 2} + 3b^2L_m^{\ 2}$$

$$s_3 = 2b + 3L_m$$

$$s_4 = 2b - 3L_m$$

$$s_5 = 27ab^2L_m^{\ 2}s_4 - 2a^3s_3^{\ 3} + 9abL_m s_3\left(4a^2 + bL_m\right)$$

$$s_6 = s_1 + \sqrt{4s_2^{\ 3} + s_5^{\ 2}}$$

27. (Previously presented) A method for manufacturing an optical transmission device according to claim 24, wherein said reflective structure forms a part of a spheroid with a major axis as a rotation axis, and said terminal area comprises one focal point of an elliptic section with the rotation axis of said spheroid as a major axis, in which said self-forming optical transmission device is designed to advance rectilinearly at least from that the other focal point.

28. (Previously presented) A method for manufacturing an optical transmission device according to claim 27, wherein axes of coordinates are taken in a space, and said designed terminal area has a disk shape with a radius a centered at a point (0, b/2, 0) and

perpendicular to the y axis, in which said clad portion is designed to advance rectilinearly from a position of a point (0, -b/2, 0) , and said spheroid is made by rotating a following ellipse with the y axis as a major axis around the y axis as the rotation axis,

$$\frac{x^2}{a_0^{\,2}} + \frac{y^2}{b_0^{\,2}} = 1, z = 0$$

$$a_0^{\,2} = \frac{a^2 + a\sqrt{a^2 + b^2}}{2}$$

$$b_0 = \frac{a + \sqrt{a^2 + b^2}}{2}$$

29-34. (Canceled).

35. (Previously presented) A method for forming an optical transmission device within an optical transmission and reception module for transmitting and receiving an optical signal, said optical transmission and reception module having internally a light emitting element for emitting a light beam for communication with a predetermined wavelength and a light receiving element for receiving the light beam, said method comprising:

introducing a light beam of a predetermined wavelength for formation of the optical transmission device into a space area for forming said optical transmission device within said optical transmission and reception module to harden a photosetting resin solution in an optical axis direction;

inserting one end of an optical fiber through a light input/output opening of said optical transmission and reception module;

outputting said light beam of predetermined wavelength for communication by emitting light from said light emitting element;

detecting a quantity of output light output to the outside of said transmission and reception module via said optical fiber among said light beam of predetermined wavelength for communication that is output;

adjusting a light input/output axis direction of said optical fiber such that said quantity of output light is substantially at maximum; and

entering a second light beam of predetermined wavelength for formation of said optical transmission device from the other end of said optical fiber into said optical transmission and reception module, while maintaining the adjusted light input/output axis direction of said optical fiber.

36. (Previously presented) A method for forming the optical transmission device according to claim 35, wherein said photosetting resin solution comprises a mixture solution of a first photosetting resin solution having a longer setting start wavelength than said predetermined wavelength and a second photosetting resin solution having a shorter setting start wavelength than said predetermined wavelength, and

wherein an axial core portion is formed by hardening only said first photosetting resin solution with the light beam of predetermined wavelength from said light source, and then a clad portion having a smaller refractive index than that of said core portion is formed around said core portion by applying light in a wavelength band for hardening said first and second photosetting resin solutions from around said mixture solution.

37. (Original) A method for forming the optical transmission device according to claim 35, wherein the optical transmission device is produced in a state where one end of said optical fiber is immersed in said photosetting resin solution.

38. (Previously presented) A method for manufacturing an optical transmission device according to claim 2, wherein said first photosetting resin comprises one of an acrylate, acryloyl radical, methacrylate, metacryloyl radical, photosensitive polyimide, photosensitive styrene, divinylbenzene and unsaturated polyester, and

wherein said second photosetting resin comprises one of an epoxy ring, oxetane ring, oxirane ring, cyclic ether compound, cyclic lactone compound, cyclic acetal compound, and vinylether compound.

39. (Previously presented) A method for manufacturing an optical transmission device according to claim 1, wherein said first polymerization type comprises cationic polymerization, and said second polymerization type comprises radical polymerization,

wherein said first photosetting resin comprises one of an epoxy ring, oxetane ring, oxirane ring, cyclic ether compound, cyclic lactone compound, cyclic acetal compound, and vinylether compound, and

wherein said second photosetting resin comprises one of an acryloyl radical, acrylate, metacryloyl radical, methacrylate, photosensitive polyimide, photosensitive styrene, divinylbenzene and unsaturated polyester.

40. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said wavelength of said first irradiation includes 488 nm.

41. (New) The method for manufacturing an optical transmission device according to claim 40, wherein a wavelength of said second irradiation includes 385 nm.

42. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said wavelength of said first irradiation includes 650 nm.

43. (New) The method for manufacturing an optical transmission device according to claim 42, wherein a wavelength of said second irradiation includes 520 nm.

44. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said first photopolymerization initiator comprises a radical photopolymerization initiator.

45. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said first photopolymerization initiator comprises at least one of a benzyldimethylketal compound, a α-hydroxyketon compound, a α-aminoketon compound, a bisacylphosphineoxide compound, and a metallocene compound.

46. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said first photopolymerization initiator comprises at least two of a benzyldimethylketal compound, a α-hydroxyketon compound, a α-aminoketon compound, a bisacylphosphineoxide compound, and a metallocene compound.

47. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said first photopolymerization initiator comprises at least one of

a benzyldimethylketal compound including 2,2-dimethoxy-2-phenylacetophenone;

a α-hydroxyketon compound including at least one of 2-hydroxy-2-methyl-phenylpropane-1-on, and (1-hydroxycyclohexyl)-phenylketon;

a α-aminoketon compound including at least one of 2-benzyl-2-dimethylamino-1-(4-morpholinophenyl)-butane-1-on, and 2-methyl-1-(4-(methyltio)phenyl)-2-morpholinopropane-1-on;

a bisacylphosphineoxide compound including at least one of bis(2, 6-dimetoxybenzoil-2, 4, 4-t rimethyl-pentylphosphineoxide, bis(2, 4, 6-trimethylbenzoil)-phenylphosphineoxide; and

a metallocene compound including bis(η-cyclopentadienyl)-bis(2, 6- -difluoro-3-(N-pyroyl)phenyl) titan.

48. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said second photopolymerization initiator comprises a cationic photopolymerization initiator.

49. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said second photopolymerization initiator comprises at least one of a triarylsulfonium salt compound, a diaryl iodonium salt compound, and a meallocene compound.

50. (New) The method for manufacturing an optical transmission device according to claim 1, wherein said second photopolymerization initiator comprises at least one of 4, 4'-bis (di (2-hydroxyethoxy) phenylsulfonio) phenylsulfidedihexyfluoroantimonate, and η-cyclopentadienyl-η-cumene iron (1+) -hexafluorophosphoric acid(1-).

51. (New) The method for manufacturing an optical transmission device according to claim 15, wherein said wavelength of said first irradiation includes 385 nm.

52. (New) The method for manufacturing an optical transmission device according to claim 51, wherein a wavelength of said second irradiation includes 385 nm.

53. (New) The method for manufacturing an optical transmission device according to claim 52, wherein said amount of exposure of said first irradiation includes 30 mJ/cm^2.

54. (New) The method for manufacturing an optical transmission device according to claim 53, wherein said amount of exposure of said second irradiation includes 60 mJ/cm^2.

55. (New) The method for manufacturing an optical transmission device according to claim 15, wherein a sensitivity of said first photopolymerization initiator for the first photosetting resin is different than a sensitivity of said second photopolymerization initiator for the second photosetting resin.